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ABSTRACT

A total of 19 good and 19 poor readers participated in an examination of the extent to which first grade children who were successful beginning readers would exhibit better syntactic skills in auditory and reading tasks than would less successful readers. To isolate differences specifically related to sentence processing skills, the two groups were equated on a measure of nonverbal intelligence. Receptive auditory vocabulary and digit span were assessed so that these potential nonsyntactic effects could be partialled out statistically. Analysis of oral reading errors provided an assessment of context utilization during reading. Performance on an oral cloze task, judgment of grammaticality and correction of ungrammatical sentences, and a pictograph sentence memory task reflected sentence processing skills in nonreading situations. The results showed that relative to the good readers, poor readers displayed less effective utilization of sentence cues in the oral cloze task. Correlational analyses revealed that corrections of ungrammatical sentences related strongly for good readers with almost all other measures--intelligence, syntactic skills, and reading. (FL)

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Differences in Syntactic Skills Between Good and Poor Readers in the First Grade[1]

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Differences in Syntactic Skills Between Good and Poor Readers in the First Grade

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The syntactic skills of equally intelligent good and poor readers in the first grade were examined. Relative to the good readers, poor readers displayed less effective utilization of sentence cues in an oral cloze task as well as in the quality of oral reading errors. Correlational analyses revealed that corrections of ungrammatical sentences related strongly for good readers with almost all other measures (intelligence, syntactic, and reading).

Researchers have long debated whether individual differences in sentence processing skills contribute substantially to relative success or failure in beginning reading (cf. Gibson & Levin, 1975). Traditional models of beginning reading which treated decoding and comprehension as separate sequential processes (e.g., Fries, 1962) have usually assumed that sentence comprehension automatically follows the identification of words and predict that the primary source of variability among young readers is the translation of orthographic symbols into words pronunciations. On the other hand, authors of more recent models (Goodman, 1976; Rumelhart, 1977; Smith, 1971) have argued persuasively that comprehension processes guide the entire reading process, even the recognition of individual words by children just learning to read. Furthermore, since such reading comprehension processes require the deliberate application of syntactic and semantic skills and since young school age children vary in their ability to display their language knowledge outside contextually rich conversational settings (Cazden, 1974; Mattingly, 1972), difficulties in learning to read might well be expected to be related to inadequate sentence processing skills.

Reviews of the empirical evidence have concluded that utilization of sentence context affects word identification processes as well as passage comprehension (cf. Gibson & Levin, 1975; Golinkoff, 1976). Relevant data on initial reading acquisition in the first grade, however, is quite sparse. In two studies conducted in our laboratory, non-reading measures of sentence skills have related significantly to a word-recognition measure of reading (Slosson Oral Reading Test). First, ability to generate sentences using a multigrammatical function word in two distinct, appropriate ways discriminated significantly between first and second grade children with relatively high vs. low

word recognition scores (Ryan, McNamara & Kenney, 1977). Second, word recognition correlated significantly with correction of ungrammatical sentences and sentence repetition across kindergarten, first, and second grades (Ryan & Ledger, Note 1). A more extensive study with second grade boys by Vogel (1974) revealed that the normal readers performed significantly better than dyslexic children on seven of nine measures of oral syntax. In terms of contextual use while reading, differences between successful and less successful readers can be inferred from oral reading performance. Weber (1970) found that good and poor readers (based on a median split) did not differ in the percentage of errors which maintained the grammatical structure of the sentence, but only the good readers exhibited a differential tendency to correct ungrammatical errors. After analyzing the pause and stress patterns of the oral reading of 7-year-olds, Clay and Imlach (1971) noted that all but the readers in the top quartile read text as though reading a word list (i.e., approximately one word per stress/pause). Such a 'word-list' reading style may have reflected a failure to predict effectively what subsequent words might be on the basis of structural and semantic cues. Thus, some relations between reading performance and sentence processing skills have been observed among young beginning readers; but none of these studies has observed such processing in both reading and oral contexts nor has any study controlled for other possible variables (e.g., intelligence, vocabulary skills, decoding expertise) that might underly these relationships.

The present investigation examined the extent to which first graders who were successful beginning readers would exhibit better syntactic skills in auditory and reading tasks than their less successful counterparts. In order to isolate differences specifically related to sentence processing skills, the

groups of good and poor readers were equated on a measure of non-verbal IQ. Receptive auditory vocabulary and digit span were assessed so that these potential non-syntactic effects could be partialled out statistically. Analysis of oral reading errors provided for an assessment of context utilization during reading. Performance on oral cloze, judgment of grammaticality and correction of ungrammatical sentences, and a pictograph sentence memory task reflected sentence processing skills in non-reading situations.

Method

Subjects

Seventy-six children enrolled in first grade classes at a predominantly middle-class suburban school served as subjects. Testing occurred near the end of the school year. Parental permission had been obtained for each participant.

The Gates-MacGinitie Vocabulary and Comprehension test of first grade reading achievement was administered to the children in their classrooms. Following the reading test, they completed a paper-and-pencil version of the Ravens Coloured Progressive Matrices Test. A representative selection of 12 of the 36 plates from the A, AB, and B sections of the Ravens test served as the stimuli. These were projected on a screen via an opaque projector, and copies of the plates served as answer sheets. After a tentative selection of target subjects had been made, another version of the Ravens (a distinct but also representative selection of 12 plates) was administered to each child individually.

The two groups were then formed from the original 76 children: 19 good readers (mean Gates-MacGinitie = 77.9) and 19 poor readers (mean Gates-MacGinitie = 46.0). The groups were equated on age (6.96 vs. 7.05 years), Group Ravens

(7.53 vs. 7.57) and Individual Ravens (6.1 vs. 6.3). Each group contained nine boys and ten girls. It should be noted that the correlation between Gates-MacGinitie and the Ravens for the original group was significant, $r = .34$, $p < .001$.

Materials

The Pictograph Sentence Memory Test materials included: a set of 84 3 x 5 cards each containing a simple line drawing depicting an object, preposition, verb or color; toys for each noun-pictograph (a little girl and cat, a big boy and dog, a yellow and a green penny, a red and green block, a red and a blue truck and a small pillow); and a hand-operated desk bell.

The Peabody Picture Vocabulary Test was employed as a non-syntactic measure of verbal intelligence and the Digit Span (forward and backward) task of the WASC served as an index of basic memory capacity. The Digit Span and Sentence Judgment/Correction tasks were pre-recorded on cassette tapes while the Nonsense Word Phonics and the Oral Reading task involved sheets typed in primary-size letters. Two muppet-type dolls were used in the Judgment and Correction Task. All sessions were recorded on audio cassette tapes with a Sony 110 tape recorder.

Procedure

The children were individually tested during school hours in a small room near their classroom. All children received the Peabody Picture Vocabulary Test and Pictograph Sentence Memory Task in that order, followed by one of two random orders of the remaining tasks.

Since the details of the Pictograph Sentence Memory Task are available in Ledger and Ryan (Note 2), only a brief summary of the procedure will be provided here. Initially, the experimenter taught the child the name and an appropriate

toy enaction (point to the object named or act out the verb or preposition with one or two objects) for each of 24 pictographs. After these were learned to a criterion of one complete series without error, three short meaningful sequences of pictographs were presented to the child who was asked to 'read' them and act them out with toys. Then the actual memory task was described to them; the children were to 'read' a meaningful pictograph sentence (minus articles) that was 5 to 8 pictographs in length and then they were to recall the pictographs after a delay of 10 seconds. They were instructed to do anything they liked to help them remember, and previous research (Ledger & Ryan, Note 2) has indicated that enactions with the toys of sentence meanings would lead to high memory scores. Memory performance was scored by assigning one point for each pictograph recalled plus an additional point for recalling the pictograph in the correct order. The maximum score for the eight pictograph sentences was 104.

In the Sentence Judgment/Correction task, a series of 40 taped sentences (2 grammatical and 2 ungrammatical sentences for ten types of structural violation) were presented to each child. The child's task was to decide for each sentence which of two puppets (Walter whose way of talking was silly or Jack who said things well) would have said it. For the 20 ungrammatical sentences, the children were asked to 'change' the words so that you are saying almost the same thing, but without any mistakes.[1] This task, then, yielded two scores, a bias-free measure of correct judgments and number of appropriate corrections.

The Oral Cloze task consisted of two practice and twelve test sentences which were presented orally by the experimenter. The sentences had been developed earlier in pilot work. Each contained a missing word which the experimenter read as 'blank'. The child was asked to supply one word which fit into the sentence in place of the blank. Responses were scored for grammatical and semantic appropriateness by two raters. Interrater reliability for the categories used

in data analyses exceeded 95%.

In the Oral Reading task, each child read three passages of approximately 50 words each, from beginning first grade, advanced first grade, and second grade levels. The child's oral reading errors (uncorrected) were scored for grammatical and semantic appropriateness by one of the raters.

In the Nonsense Word Phonics Skills test, children were asked to pronounce a list of fifteen nonsense words. Scores for this task consisted of the number of completely accurate pronunciations. The value of such a task to assess phonic skills separate from word recognition has been clearly articulated by Firth (1972).

The Digit Span Task of the WASC consisted of a pre-recorded session in which a series of numbers were presented to be recalled at the sound of a bell. Digits were to be recalled in the original order for the Forward Digit Span Task (14 sequences ranging in length from 3 to 9 digits) and in the reverse order for the Backward Digit Span Task (14 sequences from 2 to 8 digits long). For each of two tasks, two practice strings were given and the task terminated when both strings of the same length were missed. For both tasks, one point was given for each string correctly recalled. The maximum score in each case, therefore, was 14.

Results

The mean performance scores on all tasks for good and poor readers are presented in Table 1, along with significance levels on individual unidirectional tests. With regard to non-syntactic measures, it should be noted that the two groups of readers (equated on nonverbal IQ) did not differ on the forward digit span or on the Peabody Picture Vocabulary Test. The significant superiority of the good readers on the backward digit span task suggests that reverse-order recall taps strategic processes in addition to basic memory capacity. Confirming

the group designations, the good readers made substantially fewer oral reading errors and correctly identified more nonsense words on the phonics task.

Insert Table 1 about here

For the nine syntactic measures, the multivariate F based on the Wilks' Lambda Criterion was significant, $F(9.24)=2.87$, $p < .019$. Univariate analyses revealed that the good readers utilized sentence context significantly more than poor readers in the oral cloze and reading tasks. Due to the dramatic difference in total oral reading errors between the two groups of readers, the results related to the quality of errors can be taken only as suggestive. The very high error rate exhibited by the poor readers on two of the three reading passages could quite probably have limited the use of contextual cues. However, examination of the mean proportions for the three difficulty levels did not reveal a systematic relation between error rate and contextual use, nor was error rate significantly correlated with the proportion scores for the poor readers. Since the grammatical judgment task was multiple choice, the average unbiased score of each group was tested against a chance level of zero. Both were found to reflect responding which was significantly more accurate than chance ($p < .001$).

The correlational patterns of variables were analyzed for the two groups of readers, even though the sample sizes were relatively small. In terms of the basic non-syntactic measures, the only relationships with reading measures achieving significance were for the good readers. The Ravens (scores based on individual testing session were used in correlations) correlated with the proportion of grammatically appropriate reading errors, $r=.44$, $p < .05$, and proportion of meaningful reading errors, $r=.41$, $p < .05$. The forward digit span correlated with the same two reading variables, proportion of grammatically appropriate reading errors, $r=.46$, $p < .05$, and proportion of meaningful errors, $r=.47$, $p < .05$.

Correlations between reading and syntactic variables are presented in Tables 3a and 3b and the correlations between basic and syntactic measures in Tables 3a and 3b. Of particular interest is the fact that the sentence correction task accounted for approximately 25% of the variance in almost all reading and syntactic measures of the good readers. Also noteworthy are the relationships, for poor readers but not good readers, between syntactic measures and the Ravens and Vocabulary scores.

Discussion

The two equally intelligent groups of first-grade readers in this study exhibited differential sensitivity to sentence context in an oral cloze task and in the quality of oral reading errors. These findings are essentially consistent with earlier research on sentence skills and reading level which did not control for potential differences in intelligence (Ryan et al., 1977; Vogel, 1974). Although grammaticality judgments, sentence corrections, and pictograph sentence recall were more accurate for the more successful readers, the group differences were not reliable. The failure of some of the syntactic measures to discriminate reliably between the two groups may be somewhat attributable to the centralizing effects of equating procedures (cf. Waltin, 1978) and to the small samples examined. The most striking finding among the within group correlational analyses was the degree to which sentence correction performance correlated with the reading measures and the other syntactic measures, especially for good readers.

The differential quality of reading errors for the two groups of readers must be interpreted in light of the high error rate of the poor readers. An important methodological problem is raised here. Weber's (1970) data were based on children reading at their own level and thus the texts read by good and poor readers differed. In our study, the texts were constant across groups, but error rate

differences resulted. Whichever the choice in a particular investigation, the interpretation of reading error data needs to be tentative. Thus, the qualitative analysis of oral reading errors in this study should be considered as complementary to the primary, cloze task, results.

Weber's (1970) study of first grade reading errors and Biemiller's (1970) reanalysis of the data have been influential in leading reading researchers (e.g., Guthrie & Tyler, 1978) to recommend that early reading instruction focus on decoding. In contrast to Weber, we postulate that first grade poor readers tend to process linguistic material more passively and with less attention to sentence cues than good readers. Instructional attention to reading comprehension in the earliest stages of reading might not only assist young children to apply sentence processes to the reading task (cf. Ryan, in press), but one could argue that early focusing on the extraction of meaning would also facilitate the acquisition of decoding skills by increasing motivation and by providing an enhanced sense of what reading is all about (Downing, 1970).

In a recent study with intermediate grade children (Ryan & Willows, 1979), skilled readers performed better than unskilled readers on two easy-vocabulary, context stressing tasks: cloze task and oral reading of geometrically transformed text. Importantly, the good-poor reader differences were obtained in the absence of any effect for grade (fourth, fifth, and sixth). The present investigation with beginning readers complements the project with intermediate readers and suggests the importance of longitudinal research to determine whether the children who exhibit less sensitivity to sentence contexts and read poorly in first grade are the same readers who experience serious comprehension difficulties during later years of elementary school.

Reference Notes

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2. Ledger, G.W. & Ryan, E.B. Semantic integration of pictograph sequences: Effects of strategy training on memory and metalinguistic performance. University of Notre Dame manuscript, 1979.

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Table 1

Performance of Good and Poor Readers on

Syntactic and Non-Syntactic Tasks

	Group Means			
	Poor Readers[a] (N=19)	Good Readers (N=19)	t value	Level of Significance
Syntactic Tasks				
Sentence Judgment (unbiased)	2.68	3.15	.52	.302
Sentence Correction	5.79	7.32	1.16	.127
Pictograph Sentence	39.89	43.47	.63	.267
Cloze Task				
Correct Responses	7.79	9.37	2.90	.003
Grammatical Responses	7.95	9.47	2.80	.004
Meaningful Responses	9.26	10.42	2.63	.006
Oral Reading Errors				
Proportion Grammatical and Meaningful	.50 (15)	.86	3.80	.001
Proportion Grammatical	.67 (15)	.93	3.92	.001
Proportion Meaningful	.67 (15)	.95	5.16	.001
Non-Syntactic Tasks				
Peabody Picture Vocabulary	66.95	66.47	-.09	.465
Forward Digit Span	5.05	4.95	-.18	.429
Backward Digit Span	2.68	4.21	4.29	.001
Nonsense Word Phonics Task	.94	3.89	3.08	.002
Total Oral Reading Errors	53.20 (15)	6.32	-7.99	.001

[a]Numbers in parentheses indicate the number of children who completed the test.

Table 2a. Pearson Correlations of Reading Variables with Basic and Syntactic Measures for Good Readers.

	Reading Scores				Proportion of Oral Reading Errors		
Syntactic Skills	GM Vocab-ulary	GM Compre-hension	Phonics Skills	Total Reading Errors	Grammatical and Meaningful	Gram-matical	Meaningful
Judgment	.47*	.62**	.82***	-.45*	.10	.24	.21
Correction	.33	.56**	.38	-.48*	.38	.49*	.49*
Pictograph Sentence Memory	-.15	.00	.01	.17	.09	.19	.14
Cloze Task							
Correct	.31	.38	.26	-.34	-.14	-.06	-.14
Grammatical	.31	.39*	.23	-.36	-.10	-.03	-.11
Meaningful	.12	.30	.05	-.20	.02	.09	.02

* $p < .05$
** $p < .01$
*** $p < .001$

Table 2b. Pearson Correlations of Reading Variables with Basic and Syntactic Measures for Poor Readers.

	Reading Scores				Proportion of Oral Reading Errors		
Syntactic Skills	GM Vocab-ulary	GM Compre-hension	Phonics Skills	Total Reading Errors	Grammatical and Meaningful	Gram-matical	Meaningful
Judgment	.18	.00	.20	.01	-.32	-.51*	-.54*
Correction	.43*	.15	.26	-.35	.32	.07	.08
Pictograph Sentence Memory	.48*	.30	.16	-.34	.43	.30	.33
Cloze Task							
Correct	.14	.26	-.05	-.33	.26	.14	.16
Grammatical	.15	.18	-.12	-.15	.30	.11	.13
Meaningful	.17	.22	-.06	-.12	-.12	-.15	-.15

* $p < .05$

Table 3a. Pearson Correlations of Syntactic Measures with Basic and Other Syntactic Measures for Good Readers.

	Syntactic Measures					
				Cloze		
Basic	Judgment	Correction	Pictograph	Correct	Grammatical	Meaningful
Ravens	.04	.20	-.11	-.09	-.04	-.13
Peabody Vocabulary	.43*	.44*	.14	.25	.32	.15
Forward Digit Span	.07	.52*	.22	.41*	.34	.43*
Backward Digit Span	.19	.46*	.56**	.23	.25	.13
Syntactic						
Judgment		.58**	.25	.28	.24	.16
Correction			.45*	.52*	.56*	.42*
Pictograph Sentence Memory				.44*	.43*	.47*

* $p < .05$
** $p < .01$

Table 3b. Pearson Correlations of Syntactic Measures with Basic and Other Syntactic Measures for Poor Readers.

	Syntactic Measures					
				Cloze		
Basic	Judgment	Correction	Pictograph	Correct	Grammatical	Meaningful
Ravens	.40	.30	.34	.57**	.65***	.74***
Peabody Vocabulary	.29	.53**	.44*	.47*	.53**	.53**
Forward Digit Span	.02	.42*	-.05	.22	.29	.37
Backward Digit Span	.41*	.62**	.14	.39	.44*	.57**
Syntactic						
Judgment		.13	.11	-.05	.03	.16
Correction			.40*	.58**	.59**	.44*
Pictograph Sentence Memory				.33	.33	.24

* $p < .05$
** $p < .01$
*** $p < .001$